- **0th Order Pointing Knowledge Calculation**
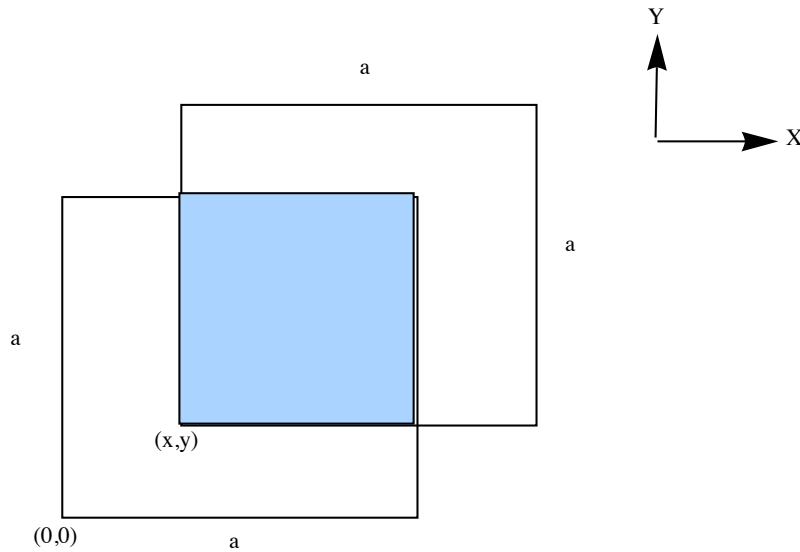
Someone said yesterday that pointing should be to say, ϵ=100 m for a=1 x 1 k ground spot. I'll assume that the % area overlap between where you are pointing and where you think you are pointing is critical. Using a very simple minded model:

Assume simple square shape without projection distortion. We *think* spot has the lower left hand corner at (0,0), but it is actually at (x,y). So $\epsilon = \sqrt{x^2 + y^2}$. Here, ϵ=RMS of all error sources, SC and the instrument transform (rotarional and displacement) to SC coordinates. For simplicity, I'll assume that x=y. Then $x = y = \dfrac{\epsilon}{\sqrt{2}}$.

In[3]:= $\mathbf{N}\left[100 \big/ \sqrt{2}\ \right]$

Out[3]= 70.7107

So the minimum dimension of the overlap is:

In[5]:= **1000 – 70.7**

Out[5]= 929.3

or in %

In[10]:= $\left(\dfrac{\mathbf{929.3}}{\mathbf{1000}}\right)^{\mathbf{2}} \mathbf{100}$

Out[10]= 86.3598

percent.

The requirement however is driven by the 250 m x 250 m case, the overlap dimension for 86% of a .25 k x .25 k square is:

In[23]:= $\sqrt{\mathbf{.8635 \times .250^2}}$

Out[23]= 0.232312

In[24]:= $.250 - \sqrt{.8635 \times .250^2}$

Out[24]= 0.0176882

or 17.6m is the error for .25 k x .25 k that corresponds to a 100 m error at 1km. For 1 k x 1k the pointing error for 700 km altitude is:

In[21]:= $\left(\dfrac{180}{\pi} \text{ArcTan}[.1 / 700] \right) 3600$

Out[21]= 29.4664

arcsec.

For the .25 x .25 case:

In[25]:= $\left(\dfrac{180}{\pi} \text{ArcTan}[.0176 / 700] \right) 3600$

Out[25]= 5.18609